

CLAIMS

1. An actuator comprising:
an insulating substrate;
a pair of silicon arms, doped with an impurity, having
5 respective one end parts connected to both end faces of the
insulating substrate;
a piezoelectric part formed on a surface opposite from
the surface connected to the insulating substrate in each
silicon arm; and
10 a first electrode formed on a surface opposite from
the surface opposing the silicon arm in each piezoelectric
part.
2. An actuator according to claim 1, further
comprising a second electrode formed on the surface formed
15 with the piezoelectric part in the silicon arm.
3. An actuator according to claim 1, wherein the
insulating substrate is constituted by glass.
4. An actuator according to claim 1, wherein the
piezoelectric part is a single-layer piezoelectric film.
- 20 5. An actuator according to claim 1, wherein the
piezoelectric part has a laminate structure comprising
alternately laminated piezoelectric and electrode films.
6. An actuator according to claim 4, wherein the
piezoelectric film is constituted by PZT.
- 25 7. An actuator according to claim 1, wherein the
first electrode comprises a multilayer structure including

a topmost layer constituted by Au or Pt.

8. A method of making an actuator, the method comprising the steps of:

5 forming a piezoelectric film pattern on one surface each of two silicon substrates doped with an impurity;

forming an electrode film on the piezoelectric film pattern;

10 bonding the two silicon substrates, each formed with the piezoelectric film pattern and electrode film, to both sides of an insulating substrate, respectively, such that the piezoelectric film patterns are oriented outward;

cutting a block having a predetermined form from a laminated substrate constituted by the two silicon substrates and insulating substrate laminated together; and

15 forming a silicon arm by cutting the block after partly removing the insulating substrate in the block on one side.

9. A method of making an actuator according to claim 8, further comprising the step of forming an electrode pattern on the silicon substrate.

20 10. A method of making an actuator according to claim 8, wherein the insulating substrate is constituted by glass.

11. A method of making an actuator according to claim 8, wherein the piezoelectric film pattern is constituted by PZT.

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